云 南 植 物 研 究 1999, **21** (2): 177～183
Acta Botanica Yunnanica

蛛网菌属在我国的首次报道及其全球地理分布*

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摘要 基于蛛网菌属（*Arachnocrea* Moravec）的模式标本及其所有种的分类特征的研究进一步明确了其系统分类位置及其分类界定；该属是肉座菌科（Hypocreaceae）中一个较原始类型。糙孢蛛网菌（*A. scabrida* Doi）采于云南西双版纳；并与日本（主模式）和新西兰标本 及其近缘种的标本作了微、宏观解剖形态学的比较，确定了本种的变异范围。该属的现代地理分布格局表明它是一个北半球温带分布属，然而其分布向南延伸至热带，历史上很可能它是一个东南亚热带起源的属，这一地域极可能是该属的物种分化中心。

关键词 蛛网菌属，糙孢蛛网菌，新记录属
分类号 Q 949

The Genus *Arachnocrea*, A New Record to China and Their Geographical Distribution Pattern in the World

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Abstract The taxonomic characteristics and position as well as delimitation of the genus *Arachnocrea* are discussed. One species *Arachnocrea scabrida* Doi collected from Xishuangbana Dai Autonomous Prefecture, Yunnan Province, P.R.China is compared with the specimens from Japan (holotype) and New Zealand as well as other specimens on macro - & micro - morphology and anatomy. The range of variations of this species was defined. It is a new record to China. In spite of the geographical distribution of all species in the genus *Arachnocrea* in the world shows the modern patterns of the temperate zone in the north hemisphere. It can be stretched to the tropical area of Southeast - Asia, it is possible that the genus was originated in this area historically. It is suggested that the tropical area might be a center of differentiation of species in the genus.

Key words *Arachnocrea*, *A. scabrida*, New record genus to China

Many hypocreaceous specimens have been collected from China in recent years. One of them is an interesting specimen from Xishuangbana Dai Autonomous Prefecture, Yunnan Province, China and has

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* This paper is the second part of the family Hypocreaceae of China. Ref. Bull. Nat. Sci. Mus. Ser. B. 21 (4): 179～188, 1995 for the first part.

1998 - 07 - 20 收稿，1998 - 08 - 24 接受发表

been classified in the genus *Arachnocrea* based on its morphological, anatomical characters of stromata and microscopic characters of ascospores. The genus is first reported in China.

The genus *Arachnocrea* was established by Moravec mainly according to the conical (fusiform) partspores and classified in the family Nectriaceae (Moravec, 1956). The genus was described as follows: Perithecia superficial, solitary, slightly embedded in the araneous subiculum, bright colored, soft; asci cylindrical, 8 - spored, latter divide into 16 spores; spores fusiform, pointed tips of spores, bicellulate, with a strongly narrow septum at the medium of each ascospore, divide into two triangular and hyaline spores at last. Doi (1972) revised and redescribed as follows: "Asci with 16 partspores; partspores conical, hyaline, smooth or rough. Perithecia situated in or half - naked on a subiculum, without stromata, conidial state unknown" and classified in the family Hypocreaceae (Doi, 1969, 1972). Three aspects should be considered as the most important characters of the genus: the first one is with araneous subiculum, without true stroma; the second is conical, hyaline partspores; the third is the position of perithecia half - naked or partly imbedded in subiculum.

This genus should be classified in the family Hypocreaceae based on its main characters, although Moravec (1956) described that the genus as well as *Protocrea* were closer to *Hypomyces* than *Hypocrea* according to the fusiform, bicellular and pointed tips of ascospores and classified in the family Nectriaceae, yet the genus with *Hypomyces* together was also retained in the family Hypomycetaceae (Howksworth *et al*, 1983). In spite of the genus *Arachnocrea* is very similar to the genus *Hypomyces* in the shape of spores (fusiform), the ascospore of the genus *Hypomyces* does not divide into two spores at its mature and always bicellular in an ascospore with a septum at medium. While the ascospores of the genus *Arachnocrea* separate into two solitary partspores by the septum at the medium of ascospores when matured, which is an important character of the genus *Hypocrea*, and a basic diagnostics of the family Hypocreaceae. However, the genus *Arachnocrea* is much close to the genus *Hypocrea* rather than the genus *Hypomyces*. It seems more reasonable to be retained in the Hypocreaceae (Howksworth *et al*, 1995; Doi, 1969, 1972; Liu & Doi, 1995).

The genus *Arachnocrea* is much similar to the genus *Protocrea* in the morphology of subiculum as well as its anatomic structure, but the latter with globose or subglobose partspores, not conical, which is similar to the partspores of the genera *Hypocrea* and *Podostroma* in the family Hypocreaceae.

The genus *Pseudohypocrea* with same conical partspores as ones of the genus *Arachnocrea*, but the former is not subiculum, with true stromata and perithecia entirely imbedded in stroma, which are more advanced than the genus *Arachnocrea*. These two genera are closer than others in phylogeny of the Hypocreaceae.

The delimitation characteristics of the genus are presented as follows based on the type specimens of all species in the genus *Arachnocrea*.

Classification

Genus **Arachnocrea** Moravec

Bull. Soc. Myc. de Fr. Tome 72: 161, 1956.

Without stroma, only with cobweb-like or araneous subiculum, even tomentose, effuse, thin, soft, often easily separated from its substratum, generally bright color, being composed of sparse and thin-walled hyphae; usually dotted with slightly deeper colored perithecia than the subiculum on the upper surface. Perithecia superficial, half or partly imbedded in the subiculum, globose or subglobose with protruding ostioles. Ascus cylindrical, with 16-partspores; partspores conical, hyaline, smooth or rough to warted. Habitat on decaying or rotten wood (branches or logs of bamboo, broadleaf and coniferous trees).

Type species: **Arachnocrea stipata** (Fuckel) Moravec

Basionyn: *Hypocrea stipata* Fuckel, Symb. Mycol. app. 1: 23, 1869; Saccardo, Syll Fung. 2: 530, 1883. ——*Sphaeria stipata* Libert, Plantae cryptog. Ardenn. N. 343, 1837; no Schweinitz, 1832; nor Rebenhorst, 1844; nor Currey, 1854. ——*Protocrea stipata* (Lib.) Petch in Journ. Bot. 75: 219, 1937. ——*Hypocrea papyracea* Ellis et Holway, Journ. Myc. 2: 6, 1886; Ellis et Everhart, North Amer. Pyren. pp. 86-87, 1892; Lindau, Engler-Prantl. Pflanzenfam. I, 1. Abt. p. 364, 1897. ——*Hypomyces papyracea* (Ell. et Holw.) Seaver, Mycologia 2: 80, 1910. ——*Hypomyces arachnioideus* Schroeter, Cohn Kryptfl. v. Schlesien III. B. 2. Halfte, p. 268, 1908.

The two species were described and reported in the world up to now with an exception of the species *Arachnocrea citrinella* (Ellis) Moravec, which had been merged into another genus *Pseudohypocrea* as the species *P. citrinella* (Ellis) Doi by Doi (1972) according to this species with the true stroma and the perithecia entirely imbedded in the stroma. An interesting specimen from southern Yunnan, China has been classified in the genus, identified as the species *A. scabrida* and described as follows.

Arachnocrea scabrida Doi (Fig. 1)

Bull. Natn. Sci. Mus. Tokyo, 15: 651, 1972.

The following descriptions are mainly based on the Chineses collections.

Subicula effuse, thin, densely byssoid cushion and irregular in shape, the margin tomentose, yellowish to ochreous-colored (5A6~5A7) (Kornerup, 1967), becoming orange to pale ochreous in dried, dotted with bright orange perithecia, up to 11.0~6.0 mm^2, 0.5~0.8 mm think; hyphae of the tissue slender, thin-walled, 3.8~8.5 μm in diameter. Perithecia half-naked, superficial to partly imbedded in the subiculum, subglobose, bright orange to yellow under microscope, 160~220 μm in diameter; necks surrounded by hyphae, some appearing as globose cells in vertical section on the upper outside layer of subicula, attenuate toward to the outside. Asci cylindrical, with 16-partspores, partspores hyaline, minutely warted to roughed, conical to wedge-shaped, the distal partspores 4.2~6.2 × 2.4~3.5 μm, mean length 5.1 μm of 30 distal partspores, mean breadth 2.8 μm, mean L/B ratio 1.8; the proximal partspores 4.7~6.2 × 2.5~3.1 μm, mean length 5.5 μm, mean breadth 2.8 μm, mean L/B ratio 1.95.

The scanning electron micrographs of partspores shows the partspores with granulose warts on the

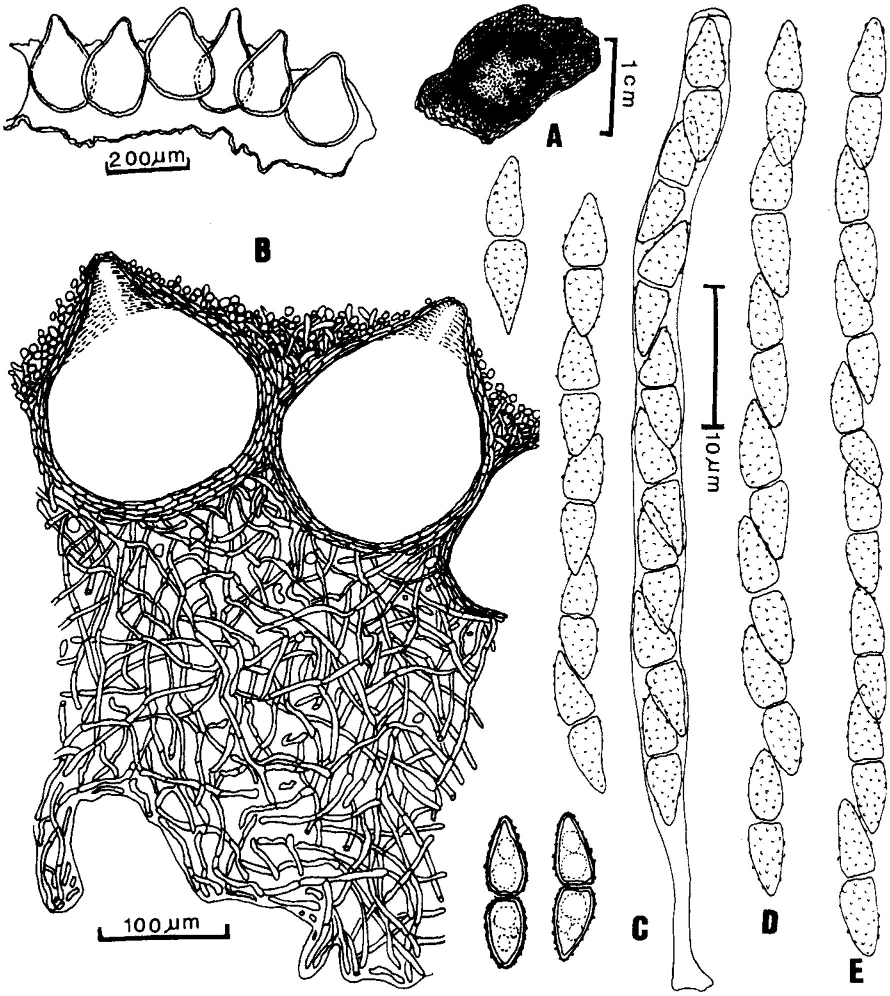

Fig.1 *Arachnocrea scabrida* Doi (KHAS 28732) . A. Habit. B. Vertical sections of subicula. C. An ascus and partspores. D. Partspores (TNS - D - 106 = TNS - F - 223292, holotypus); E. Partspores (PDD 35883).

surface of partspores, sometimes single, mostly 2 ~ 4 assembled warts; usually a granulose wart about 0.28 ~ 0.42 μm in diam.

Conidial state: unknown. No one known of conidial state up to now, it might be impossible to culture of the anamorph in the genus.

Hab. On dead and rotten wood (a broad - leaf tree log) in subtropical forest.

Specimen examined: The forest from 53 km of Menglun, Mengla County, Xishuangbana Dai Autonomous Prefecture, Yunnan Province, P.R.China; 750 m altitute, 17 - VIII - 1994, P.G.Liu, L' 94 - 25, HKAS* - 28732.

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* Cryptogamic Herbarium, Kunming Institute of Botany, Academia Sinica abbreviated HKAS.

Others specimens examined: On dead branches of *Abies*, growing together with another fungus of Corticiaceae, Tsukuba, Japan; Holotypus TNS* - F - 22392 = TNS - D - 106 deposited in Cryptogamic Herbarium, Department of Botany, National Science Museum, Japan. On a bark of *Rhopalostylis sapida*, Auckland, New Zealand; 21, Aug. 1977; G.J.Samuels 77 - 25, PDD** 35883 in the herbarium of the Plant Diseases Division, Department of Scientific and Industrial Research, Auckland, New Zaeland, sub *Arachnocrea* sp., the color of subiculum of the specimens, anatomical characteristices and partspores (as follows in the table) are very similar to the Chinese collections.

Discussion

The macro - and microscopic characters of the Chinese specimens of *Aarachnocea scabrida* are similar to those examined by Doi (Doi, 1972) in spite of the holotype TNS - D - 106 = TNS - F - 223292, Tsukuba, Japan) specimen is of some differences from the Chinese specimens. The subiculum with pale cream - colored (4A5 ~ 4A3, maize yellow to cream (Kornerup *et al*. 1967) was observed from the holotype specimen. It might be faded in color because of over more than 30 years, dotted with brown perithecia and little large partspores. It grew on dead branches of *Abies* sp. and growing together with another fungus of Corticiaceae. The specimens (PDD35883) from New Zealand are much similar to the Chinese one in the color of subiculum and partspores (as followings as table). These variations should be taken as differences at the same species level. Another species *A. stipata* (Fuckel) Moravec with white subiculum, almost smooth, sharply conical or wedge - shape and smaller partspores (the distal partspores 3.2 ~ 4.7 × 1.6 ~ 2.2 μm, the proximal partspores 3.3 ~ 4.7 × 1.8 ~ 2.4 μm of TNS - D - 9153 from Japan; the distal 3.6 ~ 5.1 × 1.8 ~ 2.4 μm and the proximal 3.8 ~ 5.3 × 1.7 ~ 2.6 μm) measured with the preparations of no. 343 from Belgium in Herbarium of Royal Botanic Gardens, Kew (K), sub *Sphaeria stipata* and no. 2358 in K, sub *Hypocrea stipata*, clearly differs from the species *A. scabrida*.

The patterns of geographical distribution are presented in Fig. 2. It shows *Arachnocrea* is a genus with a distribution pattern of the north - temperature of the world. The species *A. stipata* distributes in the temperature zone of the north hemisphere (Europe: France, Belgium, Germany, Czechoslovakia, Poland; North America: U.S.A. (Iowa, Ohio)) (Moravec, 1956), and also recorded recently from Japan (Doi, 1996). However the first author of this paper occasionally identified a specimen (PDD45922, sub *Arachnocrea* sp., on wood of *Nothofagus* sp., Gisborne, Urewera National Park, New Zealand) of this species during he checked the collections of Hypocreaceae loaned from New Zealand in Japan recently. Therefore this species is not only distributed in north temperature zone and the tropical areas of the Southeastern Asia, but also in the south temperature zone. The species *A. scabrida* found in Japan (Doi, 1972), southern Yunnan, China (a part of Southeastern Asia) and also in New Zealand. According to their geographical distribution at the present time, although the genus shows mainly a north hemisphere distribution pattern, it can be stretched into the tropical area of the Southeastern Asia and to south hemisphere. It might be a genus originated from the Southeastern Asian tropics in its history. At least the area is a center of origin and differentiation of species in the genus.

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* Mycological Herbarium, National Science Museum, Tokyo abbreviated TNS.

** Herbarium of the Plant Diseases Division, Department of Scientific and Industrial Research, Auckland, New Zealand abbreviated PDD.

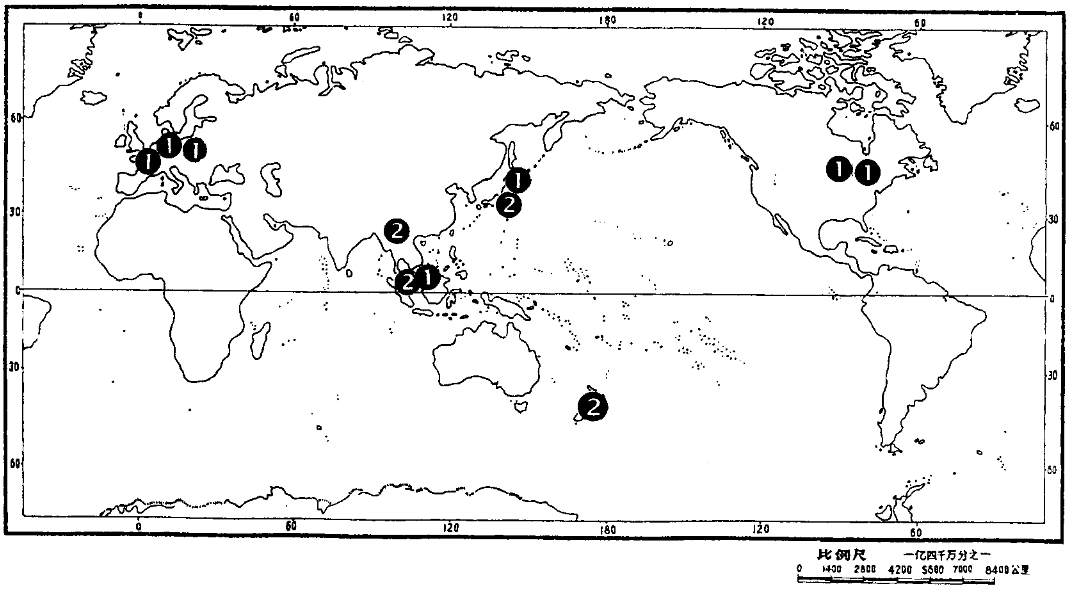

Fig. 2 The geographic distribution pattern of The genus *Arachnocrea* in the World:
1. *A. stipata* (Fuckel) Moravec; 2. *A. scabrida* Doi.

Table 1 The comparisons of the specimens from Southeastern - Asia on different localities of the species *Arachnocrea scabrida* Doi

Specimens Items	Japanese collections (Holotypus TNS - D - 106)	Chinese collections (HKAS 28732)	New Zealand collections (PDD35883)
Subicula	Maize yellow to cream colored in dried specimens	orange to pale ochreous colored in dried specimens	yellowish to pale orange colored in dried specimens
Perithecia	Brownish to brown	bright orange to yellow	yellow to orange
The distal part - spores (μm)	3.8 ~ 6.4 × 2.5 ~ 3.3	4.2 ~ 6.2 × 2.4 ~ 3.5	4.2 ~ 6.2 × 2.5 ~ 3.2
Mean length (μm)	5.48	5.14	5.22
Mean breadth (μm)	2.81	2.81	2.77
Mean L/B ratio	1.95	1.83	1.89
The proximal part - spores (μm)	4.7 ~ 6.9 × 2.4 ~ 3.1	4.7 ~ 6.2 × 2.5 ~ 3.1	4.7 ~ 6.4 × 2.4 ~ 3.3
Mean length (μm)	5.61	5.48	5.82
Mean breadth (μm)	2.77	2.81	2.71
Mean Mean L/B ratio	2.02	1.95	2.15

Acknowledgements The project supported by the Natural Science Foundation of Yunnan Province (No.97C083M), the Special Fund for taxonomy & flora of The Chinese Academy of Sciences (No.9513) and Grant - in - Aid for Scientific Research, Ministry of Education, Science, Sports and Culture, Japan (Field Research No.05041106). Sincere appreciation is due to Dr. Ming Wang of Service de Mycologie, Univ. de Paul Sabutier, France for his translation of references from the French to the Chinese. The authors are also grateful to Prof. Dr. J. M. Dingley of Plant Diseases Division, Department of Scientific and Industrial Research, Auckland, New Zealand, for her kindly loaning specimens; as well as Dr. S. P. Mikoler, Professor of Conservation Development Corporation, Colorado, USA for his review of the manuscript.

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